Service Manual

LCD Monitor P2210

Service Manual Versions and Revision

No.	Version	Release Date	Revision
1	1.0	2009-01-07	Initial Release
2	2.0	2009-03-01	Add minimum luminance spec (Chapter 5), ways to find the label Card (where agency label and S/N is located-Chapter 6)

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Dell P2210 Service Manual

Service Manual

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Chapter 1- PRECAUTIONS & SAFETY NOTICES

SAFETY PRECAUTIONS

This monitor is manufactured and tested on a ground principle that a user's safety comes first. However, improper used or installation may cause damage to the monitor as well as to the user.

WARNINGS:

- This monitor should be operated only at the correct power sources indicated on the rating label on the rear cover of the monitor. If you're unsure the power supply in your residence, consult your local dealer or Power Company.
- Use only the specified power cord that comes with this monitor.
- Do not try to repair the monitor by yourself, as it contains no user-serviceable parts. This monitor should only be repaired by a qualified technician.
- Do not remove the monitor cabinet. There is high-voltage parts inside that may cause electric shock to human bodies.
- Stop using the monitor if the cabinet is damaged. Have it checked by a service technician.
- Put your monitor only in a lean, cool, dry environment. If it gets wet, unplug the power cable immediately and consult your closed dealer.
- Always unplug the monitor before cleaning it. Clean the cabinet with a clean, dry cloth. Apply non-ammonia based cleaner onto the cloth, not directly onto the class screen.
- Do not place heavy objects on the monitor or power cord.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety visual inspections and the protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Before replacing any of these components read the parts list in this manual carefully. The use of substitute replacement parts, which do not have the same safety characteristics as specified in the parts list, may create shock, fire, or other hazards.

SERVICE NOTES

- When replacing parts on circuit boards, clamp the solder wires around terminals before soldering.
- Keep wires away from high voltage, high temperature components and sharp edges.
- Keep wires in their original position so as to reduce interference.
- Adjustment of this product please refers to the user' manual.
- Use Pb free solder wire for circuit board preparation.

Chapter 2- SERVICE TOOLS & EQUIPMENT REQUIRED

1. SIGNAL GENERATOR
2. MULTIMETER
3. SCREW DRIVER
4. OSCILLOSCOPE
5. Soldering IRON
6. SOLDER (Lead free, RoHS compliance)
7. Color Analyzer
8. Realtek ISP_Programmer
9. Fox_VEDID_Programmer

Chapter 3- CIRCUIT THEORY

Block Diagram

There are 4pcs PCBA in this monitor, one is power& inverter& board which is a single layer board, one is interface board including USB HUB 1up/4down, one is keypad which is OSD control, and one is USB transfer board located on the right side back cover. The system function block diagram as below
This is included switching power supplier, inverter for CCFL and interface board.(fig.1)

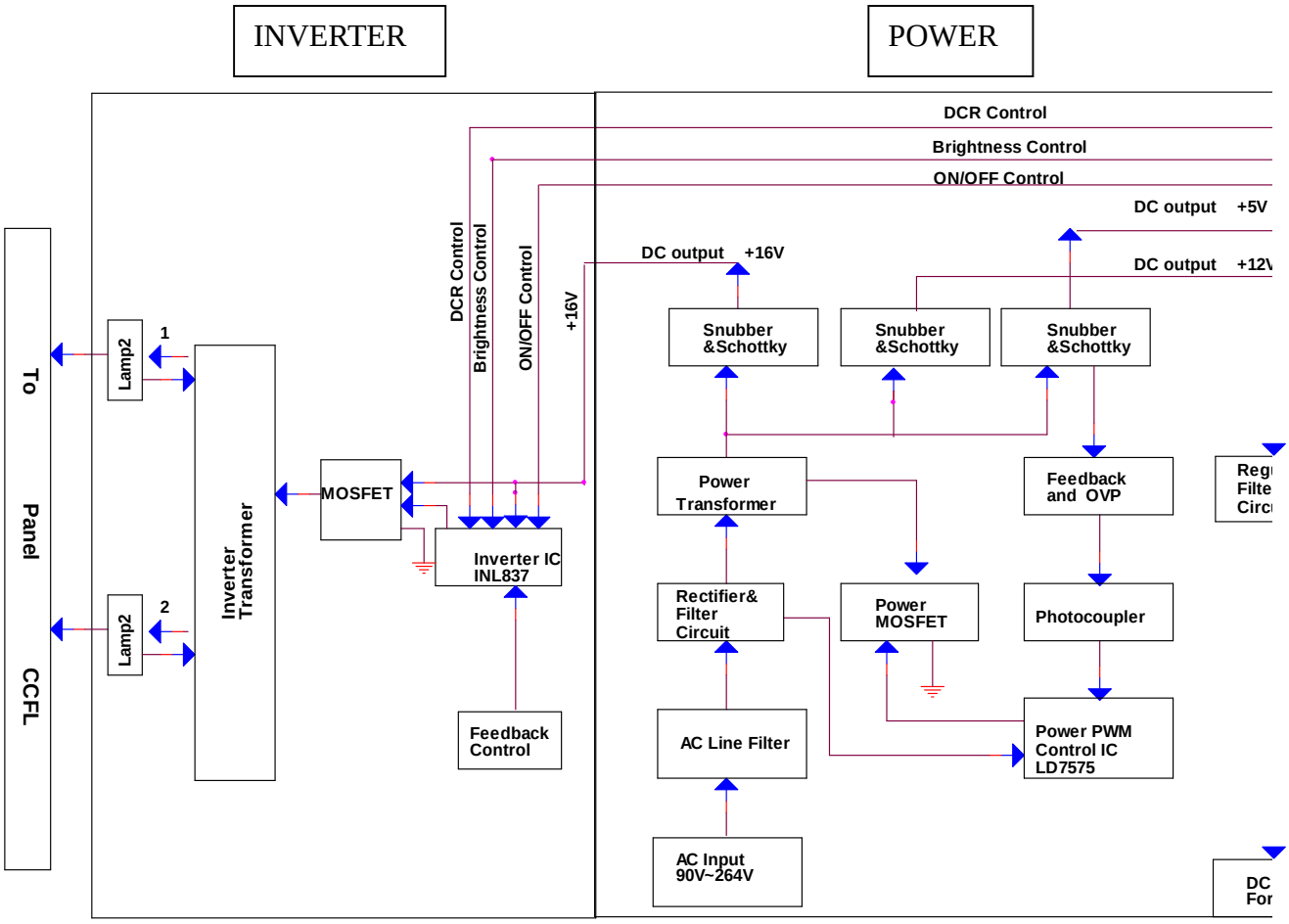


Fig.1

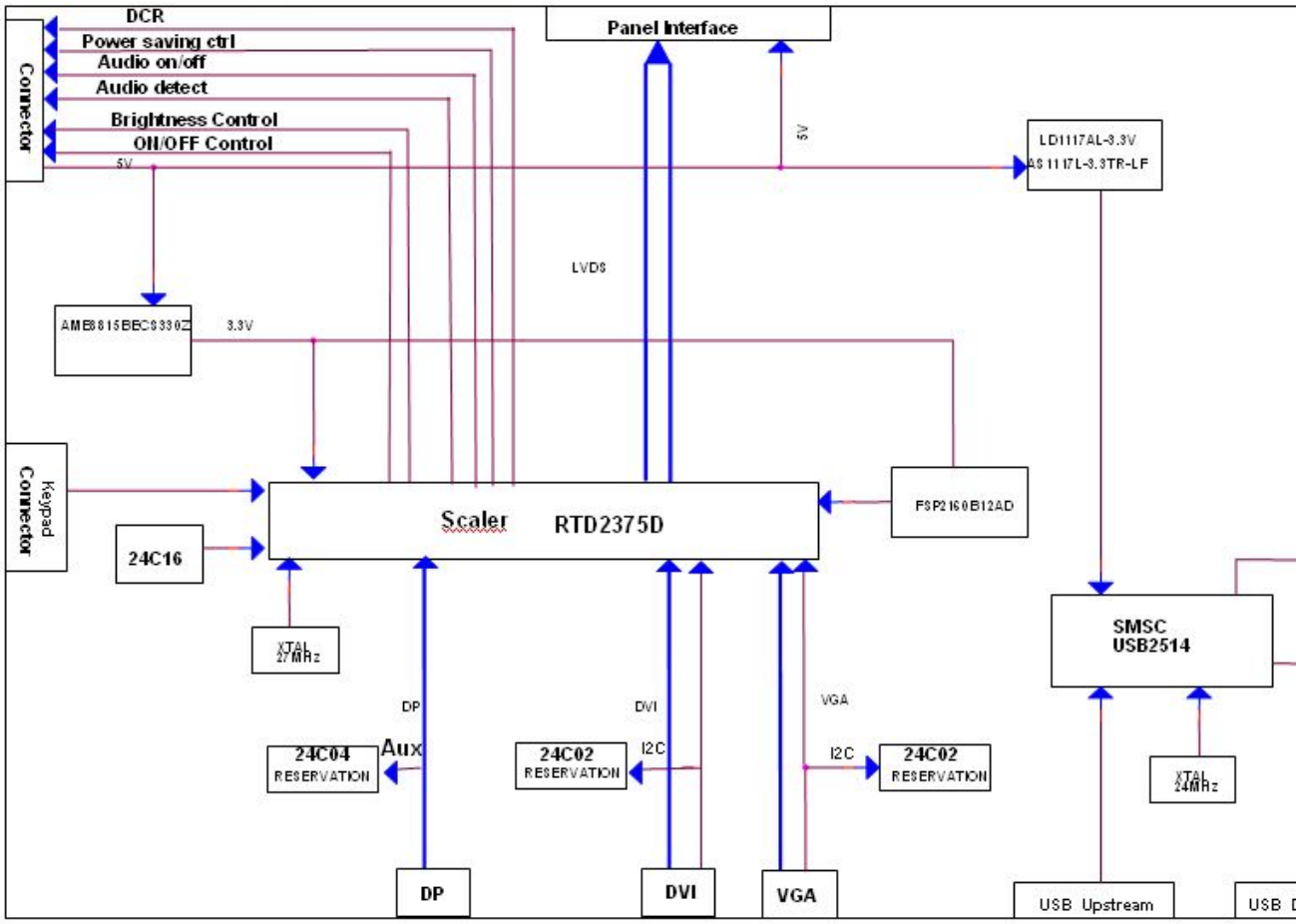

DCR
Power saving ctrl
Audio on/off
Audio detect
Brightness Control
ON/OFF Control
5V
Connector
Panel Interface
5V
LD1117AL-3.3V
AS1117L-3.3TR-LF
LVDS
AME8815BECS330Z
3.3V
Keypad Connector
24C16
Scaler RTD2375D
FSP2160B12AD
XTAL 27MHz
SMSC USB2514
DP
Aux
24C04 RESERVATION
DVI
I2C
24C02 RESERVATION
VGA
I2C
24C02 RESERVATION
XTAL 24MHz
DP
DVI
VGA
USB Upstream

Fig.12

Electronic Circuit Theory

2.1 Inverter PWM circuit

2.1.1)Inverter Control circuit:(fig.2)

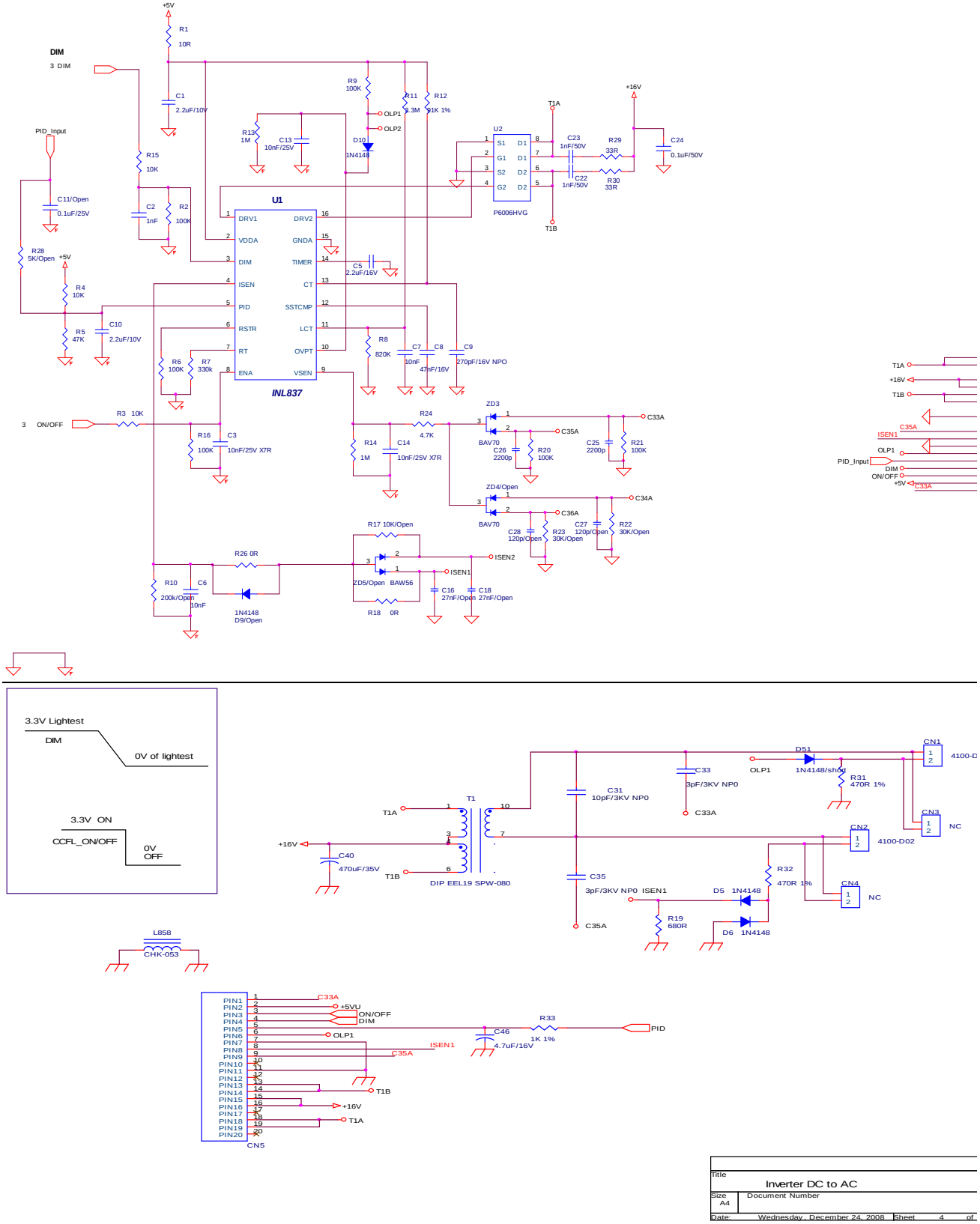


Fig.2

+5VDC provides the power for U1; the control signals Brightness and R15 makes up a divided voltage network ，DCR and ON/OFF come from I/F board. ON/OFF signal connected to pin8 of U1 makes U1 enable. Brightness signal connected to pin3 of U1 regulates the brightness of panel .PID connected to pin5 of U1 control the monitor under the condition of DCR .TIMER makes up a network of delaying time circuit and, C5 is used to control start-up timing. The operation frequency is determined by the external Resistor R7 connected to pin7 of U1 and R12 connected to pin13 of U1. C8 is used for soft start and compensation.

The output drives, include DRV1, DRV2 (pins1,16 respectively) output square pulses to drive MOSFET U2 and each of them is consist of a 2N channel MOSFET.U2 works as push-pull structure, and it is high efficient, PWM switching.

During start up, VSEN (pin9) senses the voltage at the transformer secondary. When VSEN reaches 3.0V, the output voltage is regulated. If no current is sensed for approximately 2 seconds U1 will shut off.

The current flowing through CCFL is sensed and regulated through sense resistor R31. The feedback voltage connected to Pin4 (ISEN), then compared with a reference voltage (1.2V) via a current amplifier, resulting that PWM drive U1 to work and output square pulses .

2.1.2 ）Protection Circuit

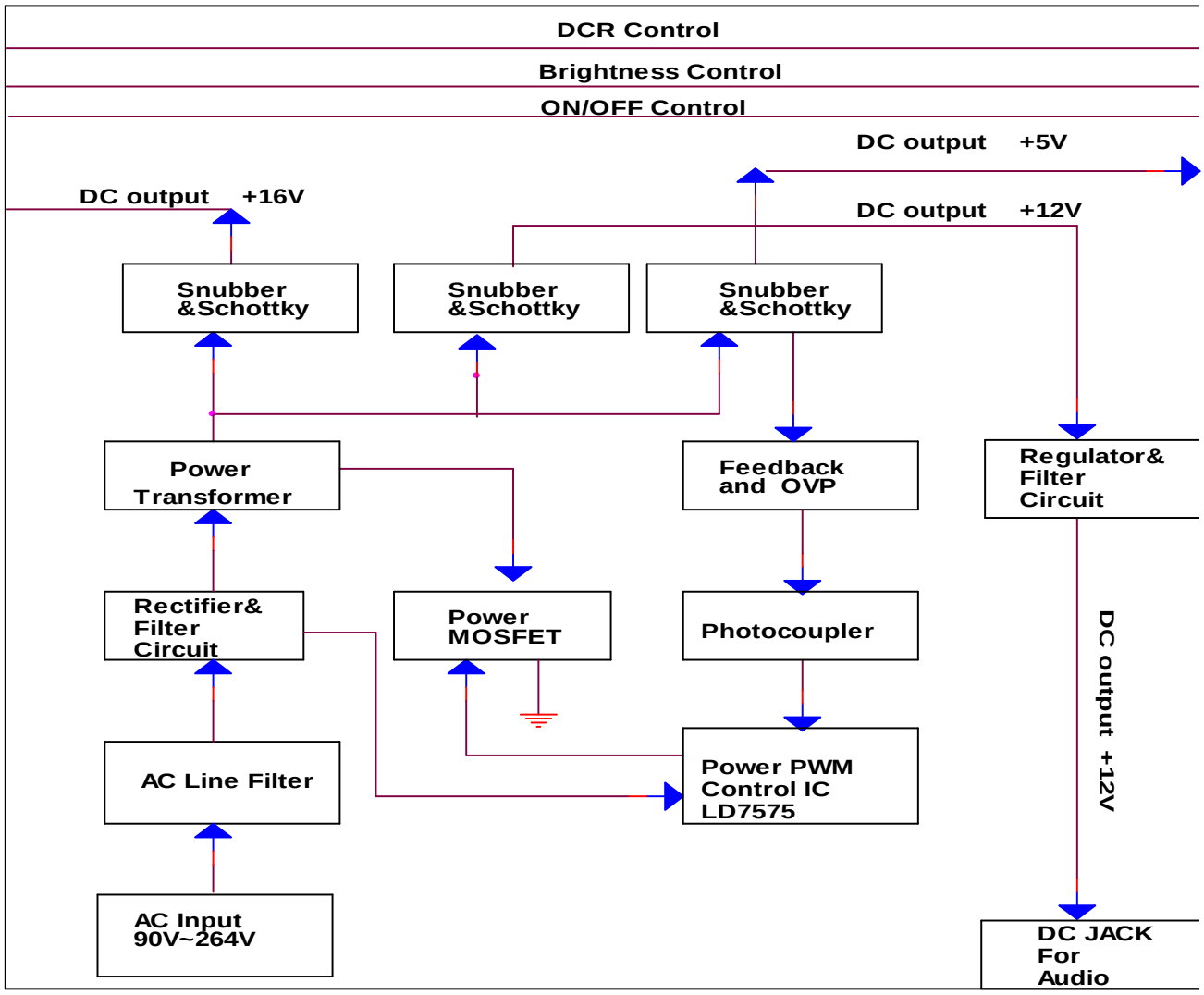
Over-voltage and over-current protection are monitored by the voltage on VSEN(pin9).During normal operation, if a CCFL is damaged or removed, the voltage at VSEN exceeds the user-defined, preset voltage set by OVPT(pin10),the driver output duty cycle is regulated and the shutdown delay timer is activated. OVPT sets the overall protection threshold voltage that is lower than3V(VSEN threshold. Once the voltage at TIMER pin reaches 3V,the IC will shut down and latch. OVPT voltage setting is determined by a resistor divider (R9 and R13)connected to the OVPT.

The over-voltage protection feature is implemented by using an external capacitor divider (C26 and C25) to sense the output voltage. The divide-down voltage signal is sent to the IC Pin9(VSEN) ,thus regulate the output voltage.

If a CCFL is removed, fails or is damaged during normal operation, CCFL current is no longer sensed and the voltage on ISEN pin drops. The voltage at the SSTCMP(pin2)rises rapidly because there is no current feedback at ISEN(pin4).When the voltage at SSTCMP reaches a threshold of approximately 2V and ISEN is less than 1.2V,a current source charges the capacitor(C5) connected to TIMER(pin14).Once the voltage level at the TIMER pin reaches a threshold of approximately 3V,the drive outputs shut down and latch.To resume operation,toggle the ENA signal or restart VDDA.

2.2 Power PWM circuit

2.2.1) Block diagram:(fig.4)



2.2.2) AC Input and EMI Filter:(fig.5)

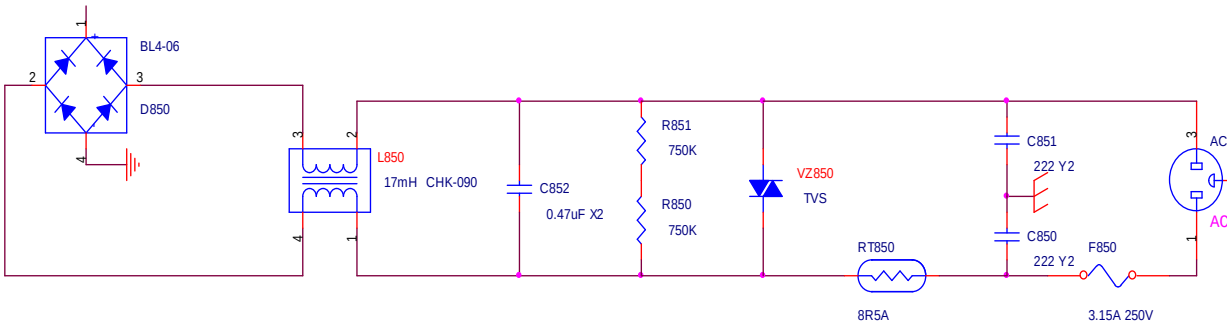
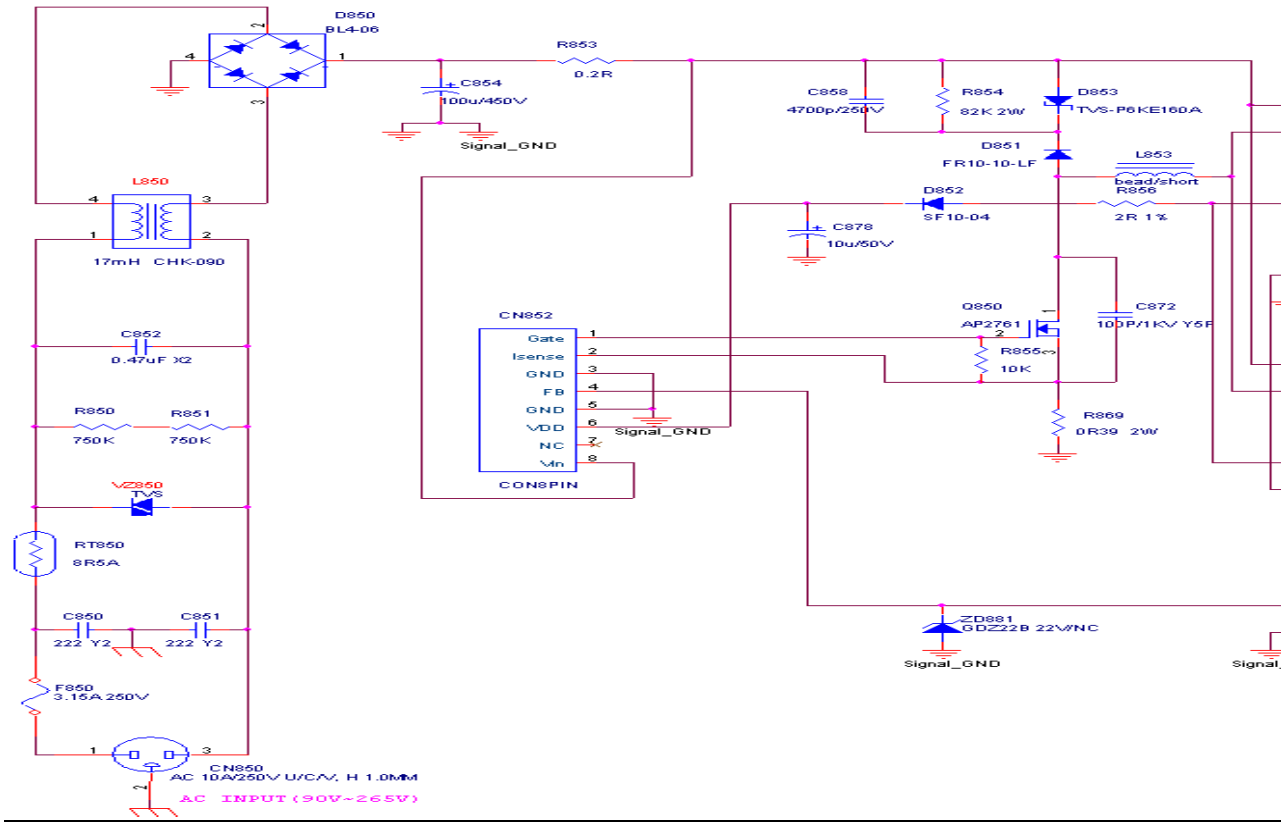


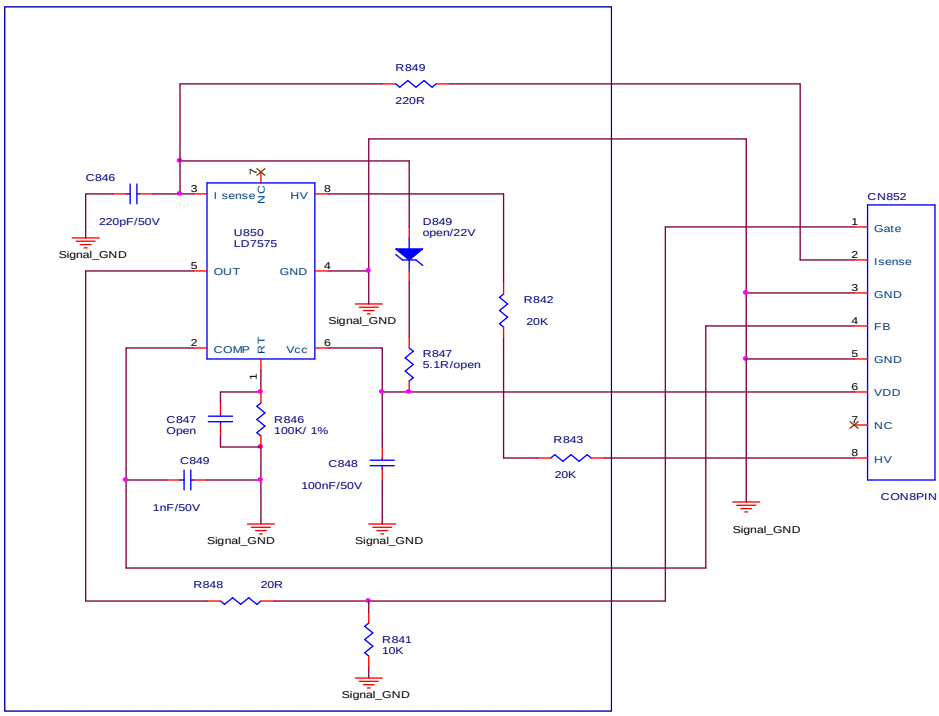
fig.5

CN850 is a connector for connecting AC Power. F850 is a fuse to protect all the circuit AC. Input voltage is from 90V to 264V. R850/R851 are joined between two inputting main circuit to prevent man from shock. L850 is used to filter low frequency noise. C850 and C851 are used to discharge the noise that L850 produced.

High frequency waves are damped by C852;

2.2.3)High Voltage to Low Voltage Control Circuit:(fig.6)





Title	Power control BD LD7575
Size A4	Document Number <Doc>
Date: Monday, February 16, 2009	Sheet 3

fig.6

D850 is a rectifier in which there are 4 build-in diodes, inverting AC to DC. C854 is used to smooth the wave from rectifier. U850 is a highly integrated PWM controller. Typical start-up current for U850 is only 20 uA, When current flow through R842/R843 gets to Pin 8 of U850, with VDD hold-up capacitor C878, U850 is enough for starting up.

When U850 begins to operate Pin5 of U850 will output square wave to drive Q850, then the main current flow get to GND bypassing through T850, Q850. Because of the change of current flow, wires in the other side of T850 will induct current. In the same time, the current inducted by wires which connected T850 Pin 1 and Pin 3, with components of D852, R856and C878 ,will be supplied to U850 for normal operating.

When the sense voltage across the sense resistor R869, reaches the threshold voltage around 0.85v, the output GATE drive will be turned off. Every time when the output of power supply is shorted or over loaded, the FB voltage will increase, the build-in PWM output will then be turned off. Both of two will prevent the power supply from being overheated under over loading condition. The PWM duty cycle is determined by this current sense signal and COMP, the feedback voltage, when the voltage on pin2 reaches V-(PWMcopm) =(Vcomp-2VF)/3, A switch cycle will be terminated immediately, Vcomp is internally clamped to a variable voltage around 0. 85 V for output power limit

When Q850 are turned off, the main current flow will be consumed through

D851, C858, R854 and D853, This will prevent Q850 from being damaged under large current impulse and voltage spike.

2.2.4) DC_16V ,12V and 5V Output Circuit and Feedback circuit: (fig.7)

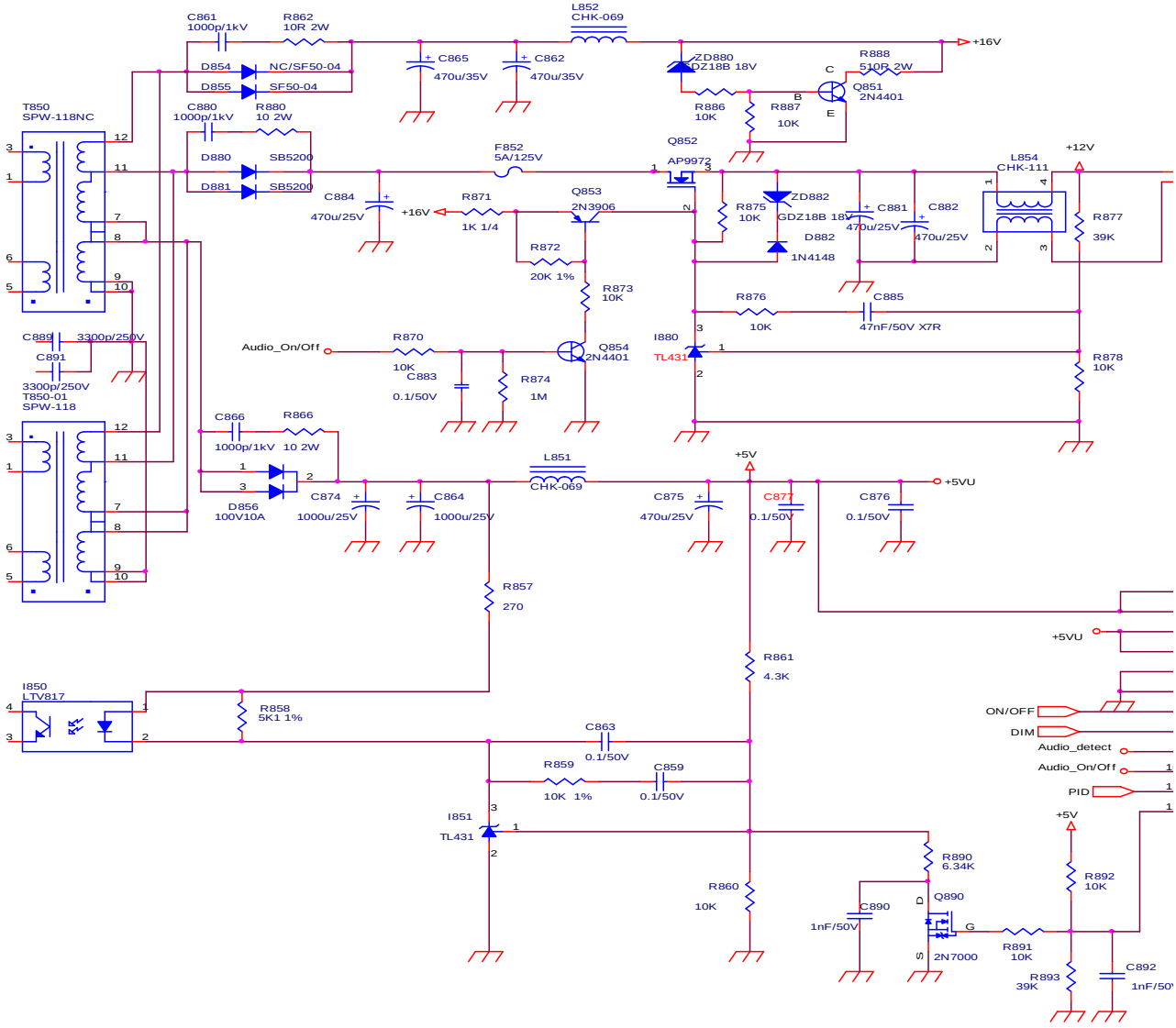


fig.7

D854&D855 are used to rectify the inducted current. C865 and C862 are used to store energy when current is reversed. The parts including L852 are used to smooth the current waves that are from D854&D855, and then 16V voltage is supplied.

D880&D881 are used to rectify the inducted current . C884 is used to store energy when current is reversed. The parts Q852 is a switch and is controlled by Q853 ,and then 12V voltage is supplied.

D856 is used to rectify the inducted current. C874,C864 are used to store energy when current is reversed. The parts including L851,and C875 are used to smooth the current waves that are from D856, and then 5V voltage is supplied.

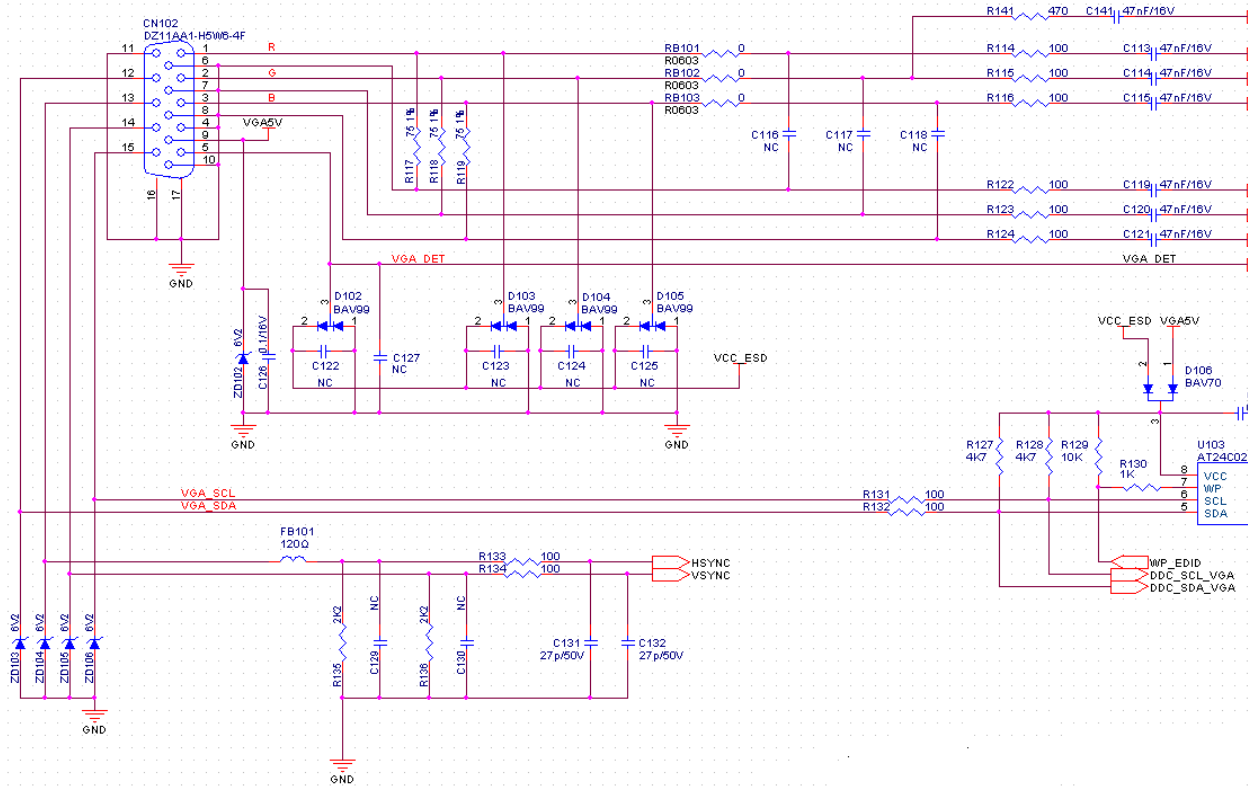
5V supply voltage feed back to PWM controller U850 via R861, R860,and I850,I851.R859,C859 and C863 are used to control response time.

LD7575 implements an OVP function on Vcc .Whenever the Vcc voltage is higher than the OVP threshold voltage, the output gate drive circuit will be shutdown

simultaneously thus to stop the switching of the power MOSFET until the next on.

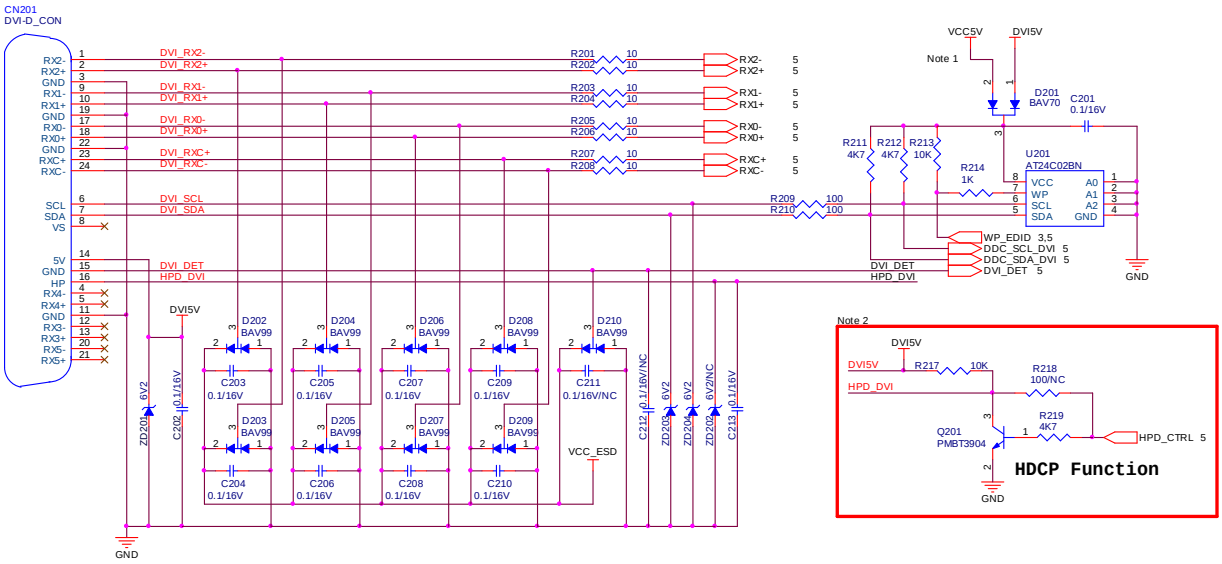
2.3 I/F Board Circuit (see the Attachment 2- Schematic)

2.3.1 RGB CAPTURE



- Signal RED,GREEN,BLUE input through CN102 #1,#2,#3, Stop DC via C114, C115 and C116, and then enter into U404 (RTD2375D) analog input PIN #16,#14,#12, and then RTD2375D deals with signal internally. D103, D104, D105 are ESD protector to prevent U404 from ESD.
- Signal DDC_SCL (series clock) inputs via CN102#15, and then passes through ZD106 for ESD protection, goes into EDID EEPROM IC U103 #58
- Signal DDC_SDA (series data) inputs via CN102#12, and then passes through ZD103 for ESD protection, goes into EDID EEPROM IC U103 #59.
- Signal TTL vertical sync. (Vsync) inputs via CN102 #14, and then clamped by ZD105 Zener, passes through R134, and then goes into IC U404 (RTD2375D) #21
- Signal TTL horizontal sync. (Hsync) inputs via CN102 #13, and then clamped by ZD102 Zener, passes through R133, and then goes into IC U404 (RTD2375D) #22.
- CN102#5 is defined as cable detect pin, this detector realize via R450 and U404#64, and D102 is ESD protector.
- U103 +5V is supplied by PC via CN102#9 with ZD102 for ESD protection, or supplied by Monitor self via D106
- U103 is an EEPROM IC which is memory and EDID data saved in it.

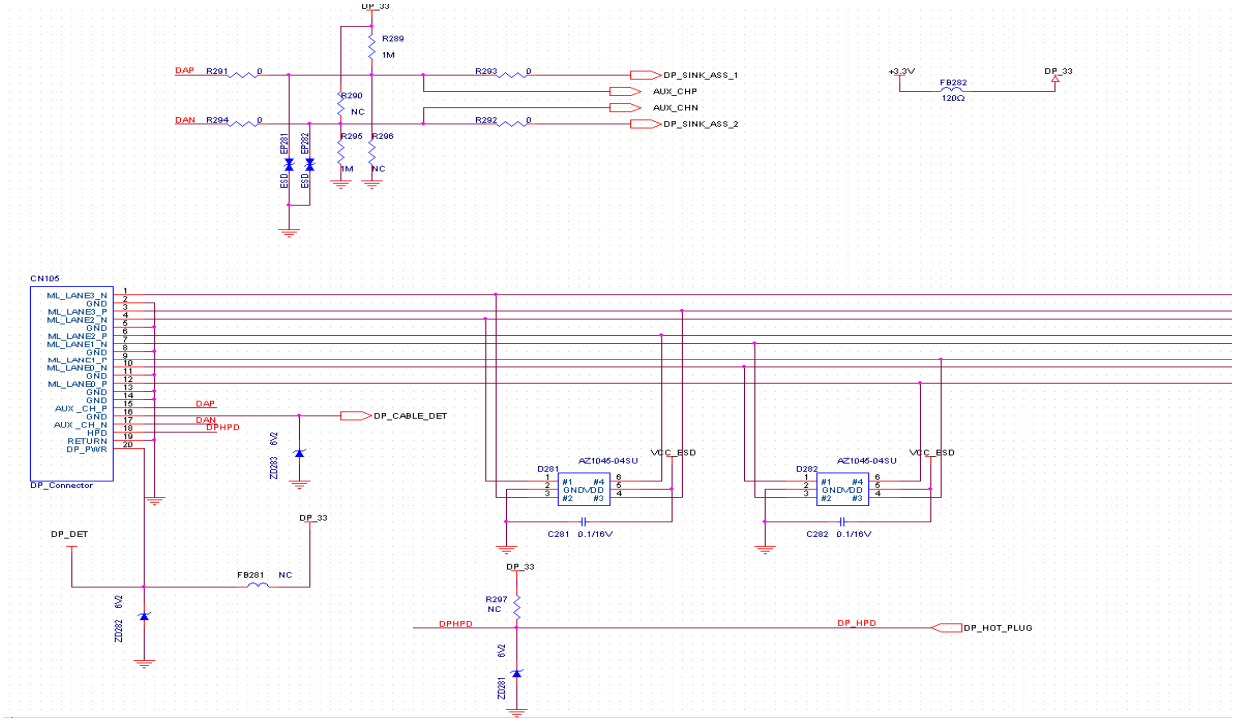
2.3.2 DVI CAPTURE



- Differential Signal input RX0+,RX0-,RX1+,RX1-,RX2+,RX2-,RXC+,RXC- through CN201 #18,#17,#10,#9,#2,#1,#23,#24 via R206,R205,R204,R203,R202,R201,R207,R208 enter into U404 (RTD2375D) Digital input terminal #4,#5,#2,#3,#47,#48,#6,#7, and then RTD2375D deals with signal internally. D206, D207, D204, D205, D202, D203, D208, D209 are ESD protector to prevent U404 from ESD
- Signal DDC_SCL (series clock) inputs via CN201#6, and then passes through ZD204 Zener for ESD protection, via R209, goes into EDID EEPROM IC U201 #6.
- Signal DDC_SDA (series data) inputs via CN201#7, and then passes through ZD203 Zener for ESD protection, via R210, goes into EDID EEPROM IC U201 #5.
- CN201#15 is defined as cable detect pin, this detector realize passes through R449, go into U404#63, and D210 is ESD protector.
- U201 +5V- U201 is an EEPROM IC which is memory and DVI input EDID data saved in it.

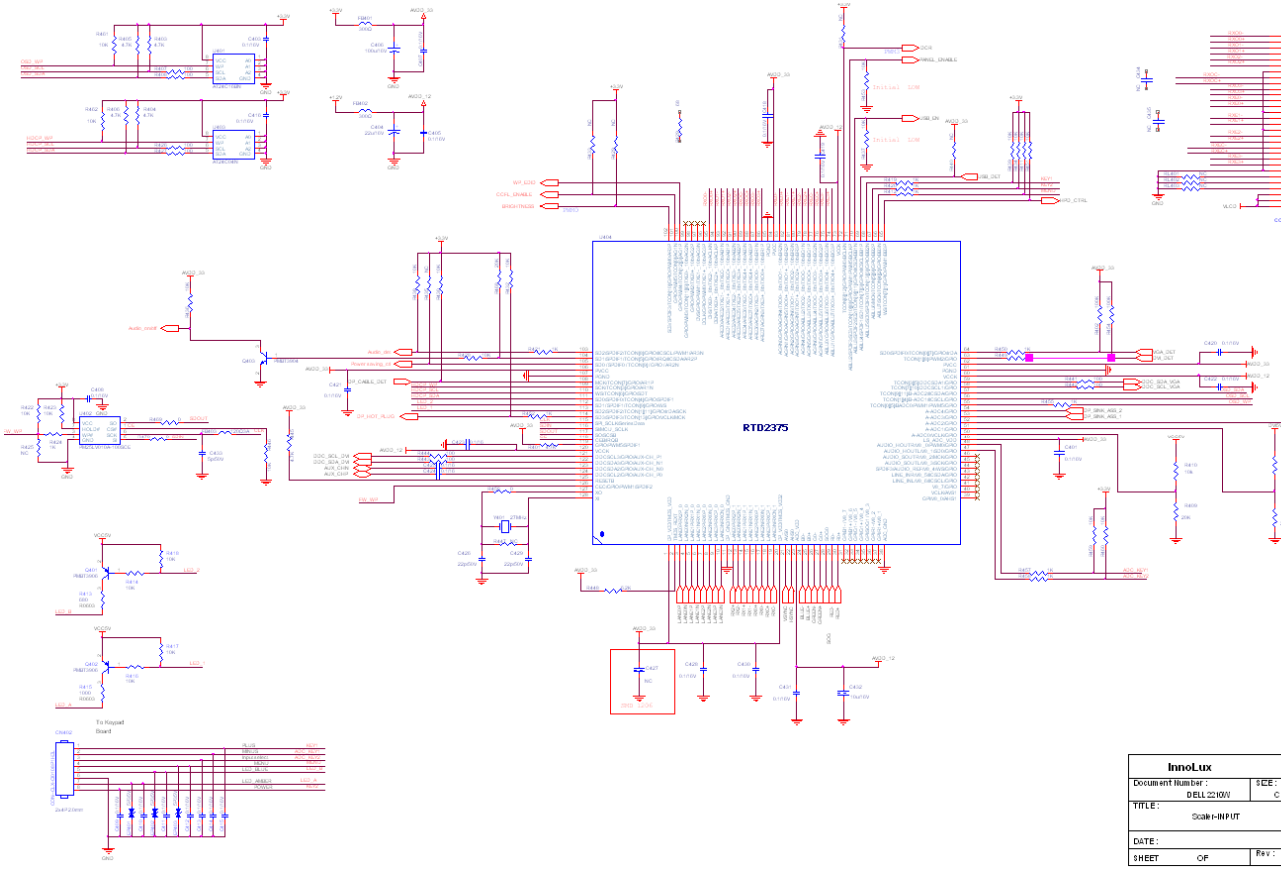
is supplied by PC via CN201#14 through D201, or supplied by Monitor self via D201.

2.3.3 DP CAPTURE



- Main Link signal LANE3N,LANE3P,LANE2N,LANE2P,LANE1N,LANE1P,LANE0N,LANE0P through CN105 #1,#3,#4,#6,#7,#9,#10,#12 enter U404 RTD2375D #10,#9,#8,#7,#6,#5,#4,#3, and then RTD2375D deals with signal internally, D201, D202 are ESD protector to prevent U404 from ESD,
- CN105#16 is defined as cable detect pin, this detector go into U404#108, and ZD283 is ESD protector.
- AUX Channel signal DAP,DAN through R291,R294,C424,C425 enter U404 RTD2375D #123,#124,through R292,R293 enter U404 RTD2375D #53,#54,EP281,EP282 are ESD protector to prevent U404 from ESD damage.

2.3.4 Buttons Control



- CN402 #8 Button “Power” on front bezel through R420 and pull high R434 connects to U404 (RTD2375D) #67.
- CN402 #1 Button “+” on front bezel through R419 and pull high R439 connects to U404 (RTD2375D) #68.
- CN402 #2 Button “-” on front bezel through R457 and pull high R459 connects to U404 (RTD2375D) #48
- CN402 #4 Button “Menu” on front bezel through R412 and pull high R411 connects to U404 (RTD2375D) #66 .
- CN402 #3 Button “SELECT” on front bezel through R458 and pull high R460 connects to U404 (RTD2375D) #14 .
- LED Indicator on Front Bezel
  a. When press button “power”, U404 (RTD2375D) #112 be send in low Voltage, make Q401#3 sends out high Voltage , and then to CN401#5 on keypad, LED blue on.
  b. When in “Suspend” mode, U404 (RTD2375D) #113 sends out a low Voltage, make Q402#3 sends out high Voltage and then to CN402 #7 on keypad, LED Amber ON.

2.3.5 MATAR CHIP U404 (RTD2375D)

- U404 (RTD2375D) #86~#95 output 8 bit even and #74~#83 output 8 bit odd LVDS digital data to panel control circuit through CN401.
- U404(RTD2375D) #71 output PPWR ”H” potential to make Q104 conducted, and then make Q101 conducted, +5V flow to CN401#1~#3 as Panel Vdd .
- U404(RTD2375D) #101 output CCFL_ON/OFF ”L” potential to control Inverter on/off.
- U404(RTD2375D) #102 outputs Brightness “PWM” signals to control CCFL

brightness.
- TCLK by Crystal 27MHz input to U404(RTD2375D) #127#128.
- U404(RTD2375D)#125 is RESET signals input pin

Please refer to U404 (RTD2375D) Pin Assignments table in page

2.3.5 Regulator Circuit

- +3.3V is generated from Regulator U101 which is supplied by+5V via R101 and through C102 filtering,
-+1.2V is generated from Regulator U102 which is supplied by+3.3V via R104 through C103 filtering,

3. FACTORY PRESET TIMING TABLE

6.1 Acceptable Signal Description	
Horizontal Frequency	30KHz to 83KHz
Vertical Frequency	56Hz to 75Hz
Sync. Polarity	Independent Sync. Polarity
6.2 Prime Mode	1680x1050@60Hz(For analog input) 1680x1050R@60Hz(For digital input)
6.3 Preset Display Modes	
1. VGA 640 x 480 @ 59.94Hz (31.469KHz)	
2.VESA 640 x 480 @ 75Hz (37.5KHz)	
3.VGA 720 x 400 @ 70.087Hz (31.469KHz)	
4.VESA 800 x 600 @ 60.317Hz (37.879KHz)	
5.VESA 800 x 600 @ 75 Hz (46.875KHz)	
6.VESA 1024 x 768 @60.004 Hz (48.363KHz)	
7.VESA 1024 x 768 @ 75.029Hz (60.023KHz)	
8.VESA 1280 x 1024 @ 60.02Hz (64.00KHz)	
9.VESA 1280 x 1024@ 75.02Hz (79.976KHz)	
10.VESA 1152 x 864 @ 75Hz (67.5KHz)	
11. CVT1680x1050@60Hz(55.935KHz,For analog input) CVT-R 1680x1050@60Hz(55.496KHz,For digital input)	
6.4 Abnormal Mode	
640 x 400 @ 70Hz (31.5KHz)	
Does not need to be a preset timing, but must display a picture. ***This is the Windows 98 start up screen.*** Only centering is required, not fully scaled.	

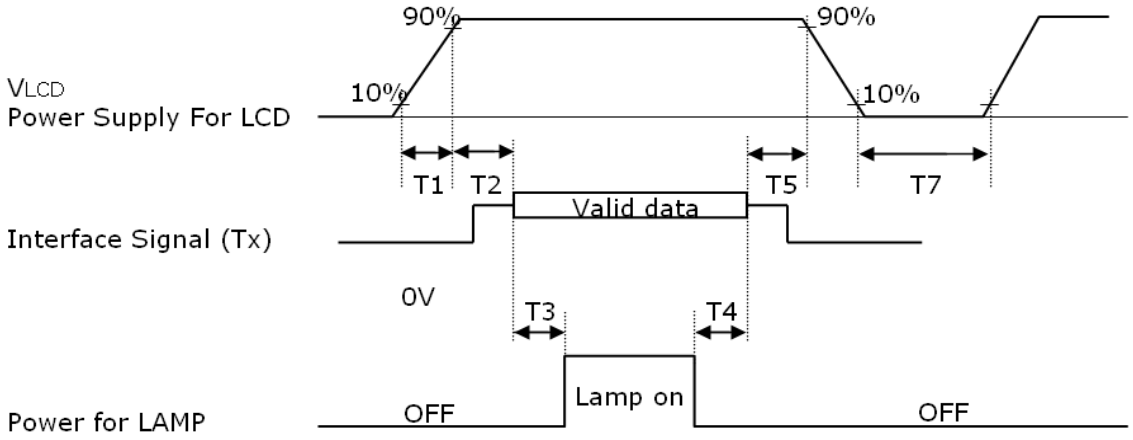
4. Power On/Off Sequency

Hardware power On/Off
When power cord plug into AC socket, Power provides 24V and DC_5V.
DC_5V is main voltage for panel and Regulator U101.
DC_3.3V is coming from Regulator U101, DC_3.3v is main voltage for U404.
When DC_3.3V input to U404 and U404 reset circuit active, U404 all registers will be set to default, that means finish hardware power on.
DC_1.2V is coming from Regulator U102, DC_1.2v is main voltage for U404.
When pull out power cord from AC socket, the system shut down instantly for no supply

Software power On/Off

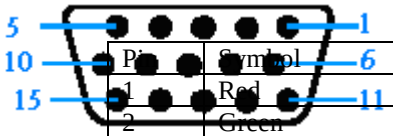
- When press power key, U404 #67 receives low pulse, then U404(RTD2375D) will be wake up and send control signals(at 101,71pin) to on CCFL and switch 5.0v to panel module, at the same time,U404 make the VGA/DVI/DP cable input signal source display normal on panel if the VGA/DVI/DP cable input signal is active
- If power ON, U404 #112 (LED_Blue) will send out low potential, and then LED blue on.
- If power saveing, U404 #113 (LED_Amber) will send out low potential, and then LED Amber on.
- If power ON or power saving, when press power key, U404 #67 receives low pulse, then U404 will be sleeping and turn off backlight, at the same time, the panel will lose +5V.

The Panel_Vcc, Backlight_En, CLK/DATA output to panel will follow the following sequency.



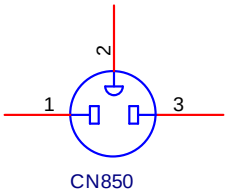
Parameter	Values			Units
	Min	Typ	Max	
T1	0.5	-	10	ms
T2	0.01	-	50	ms
T3	500	-	-	ms
T4	200	-	-	ms
T5	0.01	-	50	ms
T7	1	-	-	s

5. D-SUB Connector Pin Assignment



Pin	Symbol	Pin	Symbol	Pin	Symbol
1	Red	6	Red_GND	11	GND
2	Green	7	Green_GND	12	DDC_SDA
3	Blue	8	Blue_GND	13	Hsync
4	GND	9	PC+5V	14	Vsync
5	Cable Detect	10	GND	15	DDC_SCL

6. AC Outlet Pin Assignment



Pin	Symbol
1	Line
2	GND
3	Neutral

7. Inner Connector Pin Assignment

7.1 CN103 (Connect M/B to Panel,)

Pin	Symbol	Description
1	Panel_Vcc	Panel power supply (typ.5.0V)
2	Panel_Vcc	Panel power supply (typ. 5.0V)

3	Panel_Vcc	Panel power supply (typ. 5.0V)
4	NC	
5	NC	
6	NC	
7	GND_LVDS	LVDS Ground
8	RXE3+	LVDS signal of even channel 3(-)
9	RXE3-	LVDS signal of even channel 3(+)
10	RXEC+	LVDS signal of even channel clock (+)
11	RXEC-	LVDS signal of even channel clock (-)
12	RXE2+	LVDS signal of even channel 2(+)
13	RXE2-	LVDS signal of even channel 2(-)
14	GND_LVDS	LVDS Ground
15	RXE1+	LVDS signal of even channel 1(+)
16	RXE1-	LVDS signal of even channel 1(-)
17	GND_LVDS	LVDS Ground
18	RXE0+	LVDS signal of odd channel 0(+)
19	RXE0-	LVDS signal of odd channel 0(-)
20	RXO3+	LVDS signal of odd channel 3(+)
21	RXO3-	LVDS signal of odd channel 3(-)
22	RXOC+	LVDS signal of even channel clock (+)
23	RXOC-	LVDS signal of even channel clock (-)
24	GND_LVDS	LVDS Ground
25	RXO2+	LVDS signal of even channel 2(+)
26	RXO2-	LVDS signal of even channel 2(-)
27	RXO1+	LVDS signal of even channel 1(+)
28	RXO1-	LVDS signal of even channel 1(-)
29	RXO0+	LVDS signal of odd channel 0(+)
30	RXO0-	LVDS signal of odd channel 0(-)

7.2 CN1, CN2, CN3, CN4 (Connect to Panel Backlight,)

Pin	Symbol	Description
1	HV	High voltage for lamp
2	LV	Low voltage for lamp

8. Key Parts Pin Assignments

U404(RTD2375D)

Name	I/O	Pin #	Description	Note
TMDS_VDD/DP_VDD	AP	1	TMDS power/Display Port Power	(3.3 V)
TMDS_REXT	AI	2	Impedance Match Reference Resistor For Scan mode,it should be pulled high Scan mode: SI[7:0] is assigned to {124~121,114~111} SO[7:0] is assigned to {110~108,105~101} SE is assigned to 100.	Ref value: 6.2K ohm
LANE0P	AI	3	Display Port LANE0P	
LANE0N	AI	4	Display Port LANE0N	
LANE1P	AI	5	Display Port LANE1P	
LANE1N	AI	6	Display Port LANE1N	
LANE2P	AI	7	Display Port LANE2P	
LANE2N	AI	8	Display Port LANE2N	
LANE3P	AI	9	Display Port LANE3P	
LANE3N	AI	10	Display Port LANE3N	
TMDS_GND/DP_GND	AG	11	TMDS ground/Display Port Ground	
RX2P	AI	12	TMDS Differential signal Input	
RX2N	AI	13	TMDS Differential signal Input	
RX1P	AI	14	TMDS Differential signal Input	
RX1N	AI	15	TMDS Differential signal Input	
RX0P	AI	16	TMDS Differential signal Input	
RX0N	AI	17	TMDS Differential signal Input	
RXCP	AI	18	TMDS Differential signal Input	
RXCN	AI	19	TMDS Differential signal Input	
TMDS_VDD/DP_VDD	AP	20	TMDS power/Display Port Power	(3.3 V)
AVS0	I	21	ADC vertical sync input	5V tolerance even when power-off
AHS0	I	22	ADC horizontal sync input AVS0 and AHS0 could be used to select one of three scan chain. AHS0/AVS0: 2'b00: {i_chain[2:0], mcu_chain[1:0], vbi_chain[2:0]} 2'b01: d_chain 2'b10: vdec_chain Other are reserved	5V tolerance even when power-off
ADC_VDD	AP	23	ADC Power	(1.2V)
B0-	AI	24	Negative BLUE analog input (Pb-)	
B0+	AI	25	Positive BLUE analog input (Pb+)	
G0-	AI	26	Negative GREEN analog input (Y-)	
G0+	AI	27	Positive GREEN analog input (Y+)	
SOG0	AI	28	Sync-On-Green	
R0-	AI	29	Negative RED analog input (Pr-)	
R0+	AI	30	Positive RED analog input (Pr+)	
B1-/V8_7/GPIO	AI	31	Negative BLUE analog input (Pb-)/VIDEO 8-7/MCU GPIO	On power 3.3V tolerance

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B1+/V8_6/GPIO	AI	32	Positive BLUE analog input (Pb+)/VIDEO 8-6/MCU GPIO	On power 3.3V tolerance
G1-/V8_5/GPIO	AI	33	Negative GREEN analog input (Y-)/VIDEO 8-5/MCU GPIO	On power 3.3V tolerance
G1+/V8_4/GPIO	AI	34	Positive GREEN analog input (Y+)/VIDEO 8-4/MCU GPIO	On power 3.3V tolerance
SOG1/V8_3/GPIO	AI	35	Sync-On-Green/VIDEO 8-3 / MCU GPIO	On power 3.3V tolerance
R1-/V8_2/GPIO	AI	36	Negative RED analog input (Pr-)/VIDEO 8-2/MCU GPIO	On power 3.3V tolerance
R1+/V8_1/GPIO	AI	37	Positive RED analog input (Pr+)/VIDEO 8-1/MCU GPIO	On power 3.3V tolerance
ADC_GND	AG	38	ADC	
AHS1/V8_0/GPI	I	39	ADC horizontal sync input/ VIDEO 8-0/MCU GPI	5V tolerance even when power-off
AVS1/VCLK/GPI	I	40	ADC horizontal sync input/ VIDEO clock/MCU GPI	5V tolerance even when power-off
V8_7/TCON5/GPIO	AI	41	VIDEO8-7/TCON5/MCU GPIO	On power 3.3V tolerance
V8_6/GPIO/IICSCL	AI	42	VIDEO8-6/MCU GPIO/IIC BUS	On power 3.3V tolerance
V8_5/GPIO/IICSDA/	AI	43	VIDEO8-5/MCU GPIO/IIC BUS	On power 3.3V tolerance
V8_4/GPIO	AI	44	VIDEO8-4/MCU GPIO/	On power 3.3V tolerance
V8_3/GPIO	AI	45	VIDEO8-3/MCU GPIO	On power 3.3V tolerance
V8_2/GPIO	AI	46	VIDEO8-2/MCU GPIO	On power 3.3V tolerance
V8_1/GPIO	AI	47	VIDEO8-1/MCU GPIO	On power 3.3V tolerance
V8_0/GPIO/PWM0/	AI	48	VIDEO8-0/MCU GPIO/PWM	On power 3.3V tolerance
LS_ADC_VDD	AP	49	Low Speed ADC POWER	(3.3V)
A-ADC0/GPIO/VCLK	IO	50	MCU ADC Input /MCU GPIO/ VIDEO clock	5V tolerance even when power-off
A-ADC1/GPIO	IO	51	6-bit MCU ADC Input/MCU GPIO	5V tolerance even when power-off
A-ADC2/GPIO	IO	52	6-bit MCU ADC Input /MCU GPIO	5V tolerance even when

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				power-off
A-ADC3/GPIO	IO	53	6-bit MCU ADC Input/MCU GPIO	5V tolerance even when power-off
A-ADC4/GPIO	IO	54	6-bit MCU ADC Input /MCU GPIO	5V tolerance even when power-off
B-ADC0/GPIO/PWM1/ PWM5/TCON[5][0]	IO	55	10-bit MCU ADC Input/MCU GPIO/PWM/TCON	5V tolerance even when power-off
B-ADC1/GPIO/IICSCL/ TCON[4][1]	IO	56	10-bit MCU ADC Input / MCU GPIO/IIC BUS/TCON	5V tolerance even when power-off
B-ADC2/GPIO/IICSDA/ TCON[11][9]	IO	57	10-bit MCU ADC Input/ MCU GPIO/IIC BUS/TCON	5V tolerance even when power-off
DDCSCL1/GPIO/ TCON[10][7]	IO	58	DDC1(Open drain I/O)/ MCU GPIO/TCON	On power 5V tolerance
DDCSDA1/GPIO/ TCON[5][3]	IO	59	DDC1(Open drain I/O)/ MCU GPIO/TCON	On power 5V tolerance
VCCK	P	60	Digital Power	(1.2V)
PGND	G	61	Pad ground	
PVCC	P	62	Pad power	(3.3V)
GPIO/PWM2/TCON[8][1]	IO	63	MCU GPIO/PWM/TCON	On power 3.3V tolerance
TCON[7][0] /GPIO	IO	64	TCON/MCU GPIO	On power 3.3V tolerance
BB3P/ABLU7/GPI/ GPO/TCON[7][1]/PWM1	IO	65	RSDS/TTL/MCU GPIO/ TCON/PWM	On power 5V tolerance
BB3N/ABLU6/ABLU7/ TCON[4][2]/GPI/GPO	IO	66	RSDS/TTL 6b/TTL 8b/TCON/MCU GPIO	On power 5V tolerance
BB2P/ABLU5/ABLU6/ TCON[5][9]/GPI/ GPO	IO	67	RSDS/ TTL 6b/TTL 8b/TCON/MCU GPIO	On power 5V tolerance
BB2N/ABLU4/ABLU5 /TCON[13][3]/GPI/GPO	IO	68	RSDS/ TTL 6b/TTL 8b/TCON/MCU GPIO	On power 5V tolerance
BB1P/ABLU3/ABLU4/ TCON[7][3]/ GPI/GPO/IICSCL	IO	69	RSDS/TTL 6b/TTL 8b/TCON/MCU GPIO/IIC BUS	On power 5V tolerance
BB1N/ABLU2/ ABLU3/ TCON[9][11]/GPI/GPO/IIC SDA	IO	70	RSDS/ TTL 6b/TTL 8b/ TCON /MCU GPIO/IIC bus	On power 5V tolerance
BCLKP/AGRN7/ABLU2/ TCON[10][8]/ GPI/GPO/PWM1/PWM5	IO	71	RSDS/ TTL 6b/TTL 8b/ TCON /MCU GPIO/PWM	On power 5V tolerance
BCLKN/AGRN6/GPI/GPO/ PWM3/TCON[12][6]	IO	72	RSDS/TTL 6b/MCU GPIO/PWM/ TCON	On power 5V tolerance
VCCK	P	73	Digital Power	(1.2V)
BG3P/AGRN5/ABLU1/ TXO3+_8b/TXO4+_10b/ GPI/GPO	IO	74	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit/MCU GPIO	On power 3.3V tolerance
BG3N/AGRN4/ABLU0/ TXO3-_8b/TXO4-_10b/ GPI/GPO	IO	75	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit/MCU GPIO	On power 3.3V tolerance
BG2P/AGRN3/AGRN7/ TXOC+_8b/TXO3+_10b/	IO	76	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit/MCU GPIO	On power 3.3V

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GPI/GPO				tolerance
BG2N/AGRN2/AGRN6/ TXOC-_8b/TXO3-_10b/ GPI/GPO	IO	77	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit/MCU GPIO	On power 3.3V tolerance
BG1P/ARED7/AGRN5/ TXO2+_8b/TXOC+_10b/ GPI/GPO	IO	78	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit/MCU GPIO	On power 3.3V tolerance
BG1N/ARED6/AGRN4/ TXO2-_8b/TXOC-_10b/ GPI/GPO	IO	79	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit/MCU GPIO	On power 3.3V tolerance
BR3P/ARED5/AGRN3/ TXO1+_8b/TXO2+_10b/ GPI/GPO	IO	80	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit/MCU GPIO	On power 3.3V tolerance
BR3N/ARED4/AGRN2/ TXO1-_8b/TXO2-_10b/GPI /GPO	IO	81	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit/MCU GPIO	On power 3.3V tolerance
BR2P/ARED3/AGRN1/ TXO0+_8b/TXO1+_10b/ GPI/GPO	IO	82	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit/MCU GPIO	On power 3.3V tolerance
BR2N/ARED2/AGRN0/ TXO0-_8b/TXO1-_10b/GPI /GPO	IO	83	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit/MCU GPIO	On power 3.3V tolerance
PVCC	P	84	Pad power	3.3V
PGND	G	85	Pad ground	
BR1P/BBLU7/ARED7/ TXE3+_8b/TXO0+_10b	O	86	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit	On power 3.3V tolerance
BR1N/BBLU6/ARED6/ TXE3-_8b/TXO0-_10b	O	87	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit	On power 3.3V tolerance
AB3P/BBLU5/ARED5/ TXEC+_8b/TXE4+_10b	O	88	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit	On power 3.3V tolerance
AB3N/BBLU4/ARED4/ TXEC-_8b/TXE4-_10b	O	89	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit	On power 3.3V tolerance
AB2P/BBLU3/ARED3/ TXE2+_8b/TXE3+_10b	O	90	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit	On power 3.3V tolerance
AB2N/BBLU2/ARED2/ TXE2-_8b/TXE3-_10b	O	91	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit	On power 3.3V tolerance
AB1P/BGRN7/ARED1/ TXE1+_8b/TXEC+_10b	O	92	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit	On power 3.3V tolerance
AB1N/BGRN6/ARED0/ TXE1-_8b/TXEC-_10b	O	93	RSDS/ TTL 6b/TTL 8b/LVDS 8bit/ LVDS 10bit	On power 3.3V tolerance
ACLKP/TXE0+_8b/ TXE2+_10b/DENA	O	94	RSDS/LVDS 8bit/LVDS 10bit/ TTL Data enable	On power 3.3V tolerance
ACLKN/TXE0-_8b/ TXE2-_10b/DHS	O	95	RSDS/LVDS 8bit/LVDS 10bit/ TTL Display H-sync	On power 3.3V tolerance
AG3P/GPI/GPO/PWM0/ ECLK/DCLK/TXE1+_10b	IO	96	RSDS/MCU GPIO/PWM/TTL Display clock(Even Clock for 6bit dual TTL)/ LVDS 10bit	On power 3.3V tolerance
AG3N/GPI/GPO/PWM1/	IO	97	RSDS/MCU GPIO/PWM/TTL Display	On power

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DVS/TXE1-_10b			V-sync/LVDS 10bit	3.3V tolerance
AG2P/GPI/GPO/PWM2/ OCLK/TXE0+_10b	IO	98	RSDS/MCU GPIO/PWM/ TTL Display clock(ODD Clock for 6bit dual TTL)/ LVDS 10bit	On power 3.3V tolerance
AG2N/GPI/GPO/BGRN5/ PWM3/TCON[11][6] /TXE0-_10b	IO	99	RSDS/MCU GPIO/TTL 6b/ PWM/TCON/LVDS 10bit	On power 3.3V tolerance
AG1P/GPI/GPO/BGRN4/ PWM4/TCON[12]	IO	100	RSDS/MCU GPIO/ TTL 6b/ PWM/TCON	On power 5V tolerance
AG1N/GPI/GPO/BGRN3/ PWM5/TCON[0]	IO	101	RSDS/MCU GPIO/ TTL 6b/ PWM/TCON	On power 5V tolerance
AR3P/BGRN2/TCON[10]/ GPI/GPO/PWM0	IO	102	RSDS/ TTL 6b/ TCON/MCU GPIO/ PWM	On power 5V tolerance
AR3N/BRED7/TCON[8]/G PI/GPO/IICSCL/PWM1	IO	103	RSDS/TTL 6b/TCON[8]/MCU GPIO/IICSCL/PWM	On power 5V tolerance
AR2P/BRED6/TCON[5]/GP I/GPO /IRQB/IICSDA	IO	104	RSDS/ TTL 6b/TCON[5]/MCU GPIO/IRQ Bar/IICSDA	On power 5V tolerance
AR2N/BRED5/TCON[9]/G PI/GPO	IO	105	RSDS / TTL 6b/TCON/MCU GPIO	On power 5V tolerance
PVCC	P	106	Pad 3.3V power	3.3V
PGND	P	107	Pad 3.3V GND	
AR1P/BRED4/TCON[7]/GP I/GPO	IO	108	RSDS / TTL 6b/TCON/MCU GPIO	On power 5V tolerance
AR1N/BRED3/TCON[3]/G PI/GPO	IO	109	RSDS/TTL 6b/TCON/MCU GPIO	On power 5V tolerance
BRED2/ TCON[7][6][2]/GPIO	IO	110	TTL 6b/TCON/MCU GPIO	5V tolerance even when power-off
TCON[7][4]/GPIO	IO	111	TCON/MCU GPIO	5V tolerance even when power-off
TCON[9][5]/GPIO	IO	112	TCON/MCU GPIO	5V tolerance even when power-off
TCON[11][1]/GPIO	IO	113	TCON/MCU GPIO	5V tolerance even when power-off
TCON[13][0]/GPIO/PWM4	IO	114	TCON/MCU GPIO/PWM	5V tolerance even when power-off
SPI_SCLK/SDIO	IO	115	SPI flash serial data input/external MCU serial control I/F data in	5V tolerance even when power-off
SI/MCU_SCLK	IO	116	SPI flash serial clock/external MCU serial control I/F clock	5V tolerance even when power-off
SO/SCSB	IO	117	SPI flash serial data output /external MCU serial control I/F chip select	5V tolerance even when power-off
CEB/IRQB	IO	118	SPI flash chip enable bar/IRQ Bar Note:It should be pulled down to 0 v or pulled up to 3.3 v in order to designate the MCU type(Internal MCU(0 volts) or External MCU(3.3 volts)).	5V tolerance even when power-off
GPO/PWM5	IO	119	MCU GPO/PWM	Pull up 4.7k ohm resistance to

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				3.3V power; 5V tolerance even when power-off
VCCK	P	120	Digital 1.2V Power	1.2V
DDCSCL3/GPIO	IO	121	DDC3(Open drain I/O)/MCU GPIO	5V tolerance even when power-off
DDCSDA3/GPIO	IO	122	DDC3(Open drain I/O)/MCU GPIO	5V tolerance even when power-off
DDCSDA2/GPIO	IO	123	DDC2(Open drain I/O)/MCU GPIO	5V tolerance even when power-off
DDCSCL2/GPIO	IO	124	DDC2(Open drain I/O)/MCU GPIO	5V tolerance even when power-off
RESET	I	125	Chip Reset	Low active
GPIO/PWM	I/O	126	MCU GPIO/PWM	On power 5V tolerance
XO	AO	127	Crystal Output	On power 3.3V tolerance
XI	AI	128	Crystal Input	On power 3.3V tolerance

tial to

8.3 U850 (LD7575B, PWM Power Controller)

Pin	Symbol	I/O	Description
1	RT	I	This pin is to program the switching frequency. By connecting a resistor to ground to set the switching frequency.
2	COMP	I	Voltage feedback pin(same as the COMP pin in UC384X).By connecting a photo-coupler to close the control loop and achieve the regulation.
3	CS	I	Current sense pin, connect to sense the MOSFET current;
4	GND		Ground
5	OUT	O	Gate drive output to drive the external MOSFET
6	VCC	I	Supply voltage pin
7	NC		Unconnected pin
8	HV	I	Connect this pin to positive terminal of bulk capacitor the startup current for the controller. When Vcc voltage trips the UVLO(on),this HV loop will be off to save the power loss on the startup circuit;

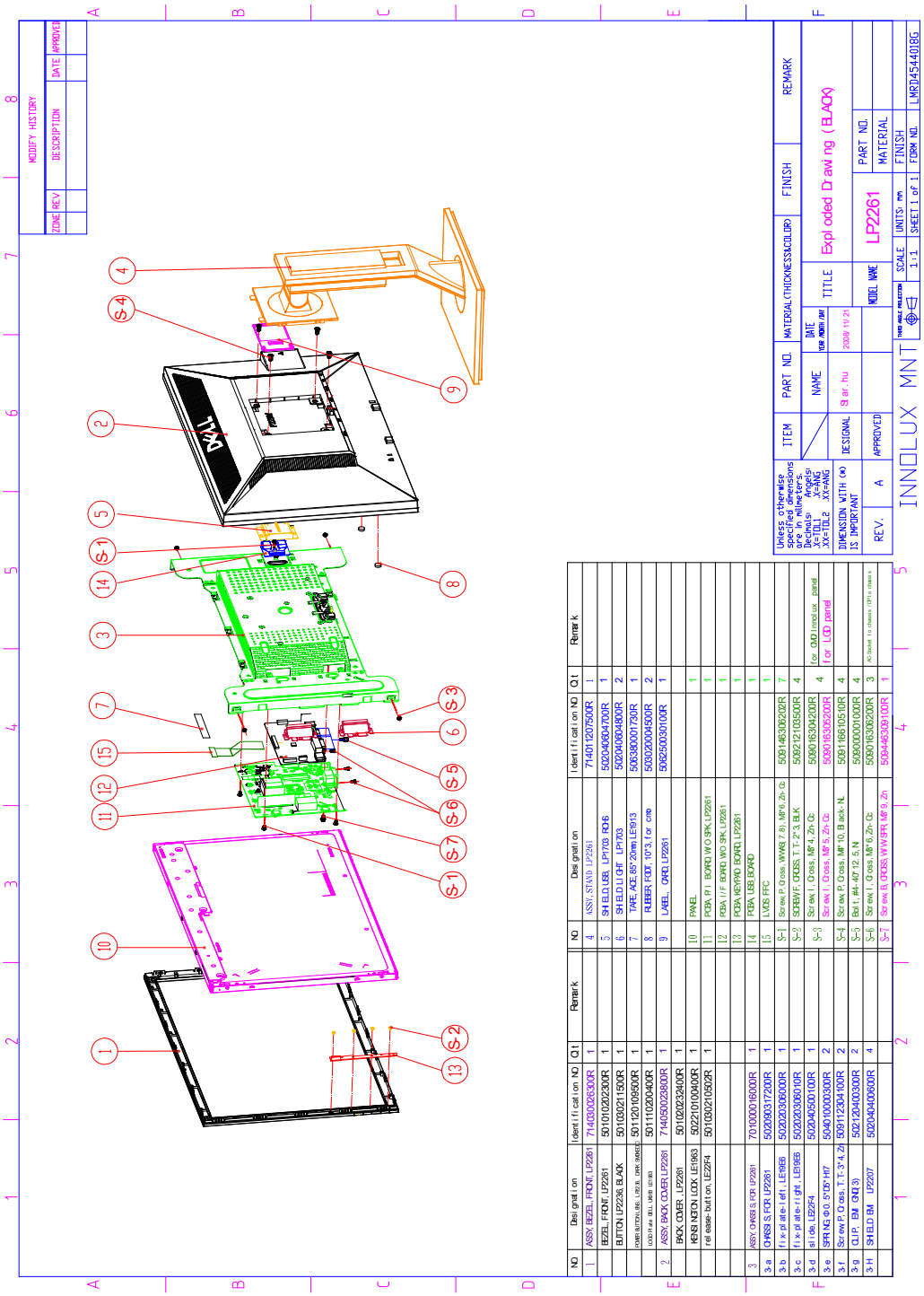
8.4 U1 (INL833, CCFL Inverter controller IC)

Pin	Symbol	I/O	Description
1	VSEN	I	Voltage sense Feedback
2	SSTCMP	I	Capacitor for soft-star and loop compensation
3	CT	I	Timing resistor and capacitor for operation and striking frequency
4	RT1	I	Timing resistor for striking frequency
5	GNDA		Signal Ground
6	PDR2	O	High side Driver output2
7	GNDP		Power Ground
8	NDR2	O	Low side Driver output2
9	NDR1	O	Low side Driver output1
10	PDR1	O	High side Driver output1
11	VDDA	I	Input power Pin
12	TIMER	I	Timing capacitor for Delay Timer
13	PWM	I	External PWM Dimming Input
14	ISEN	I	Current sense feedback

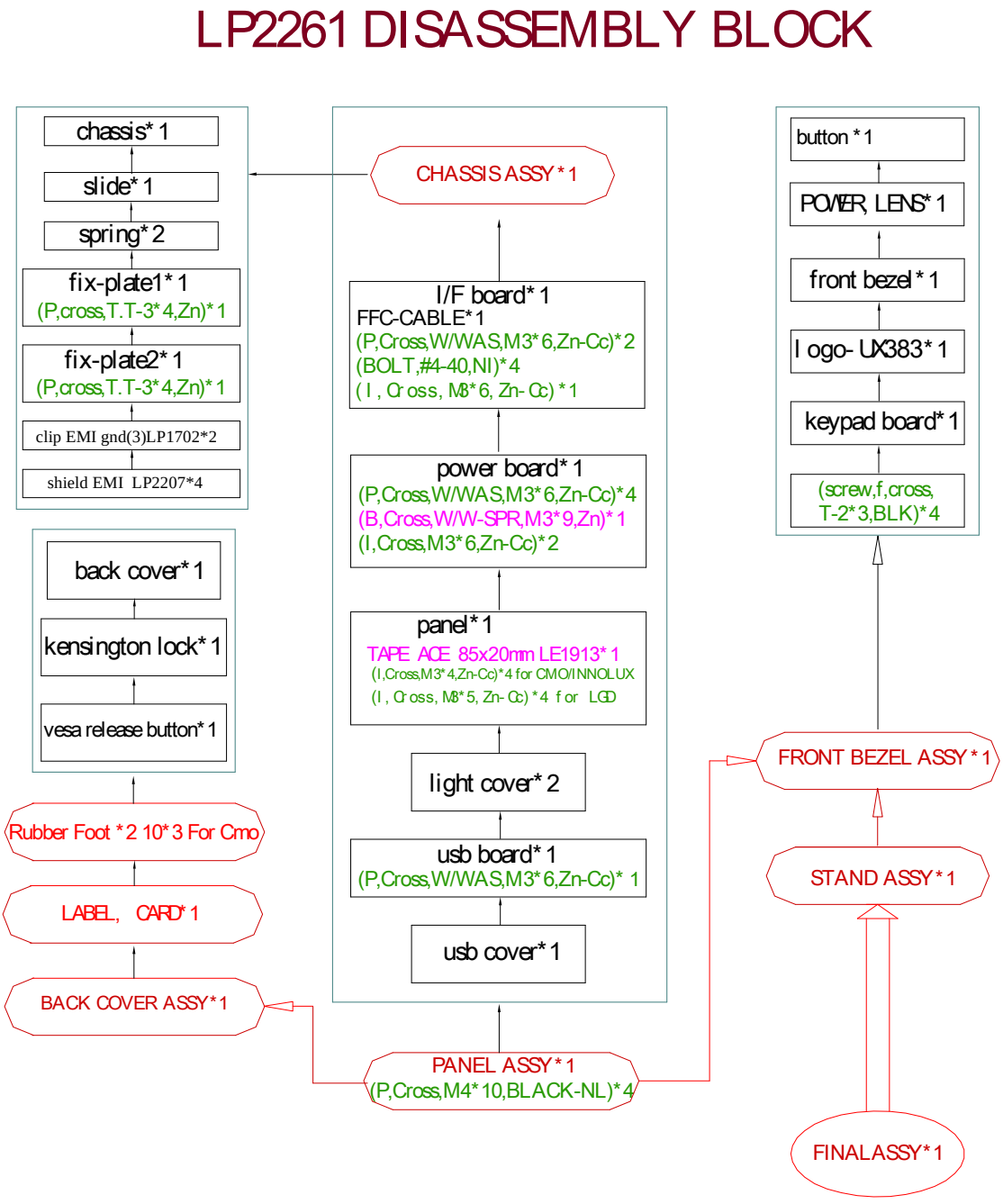
15	OVPT	I	Over-voltage protection threshold voltage
16	ENA	I	IC Enable/Disable

Chapter 4- Disassembly & Assembly

1. Exploded Diagram



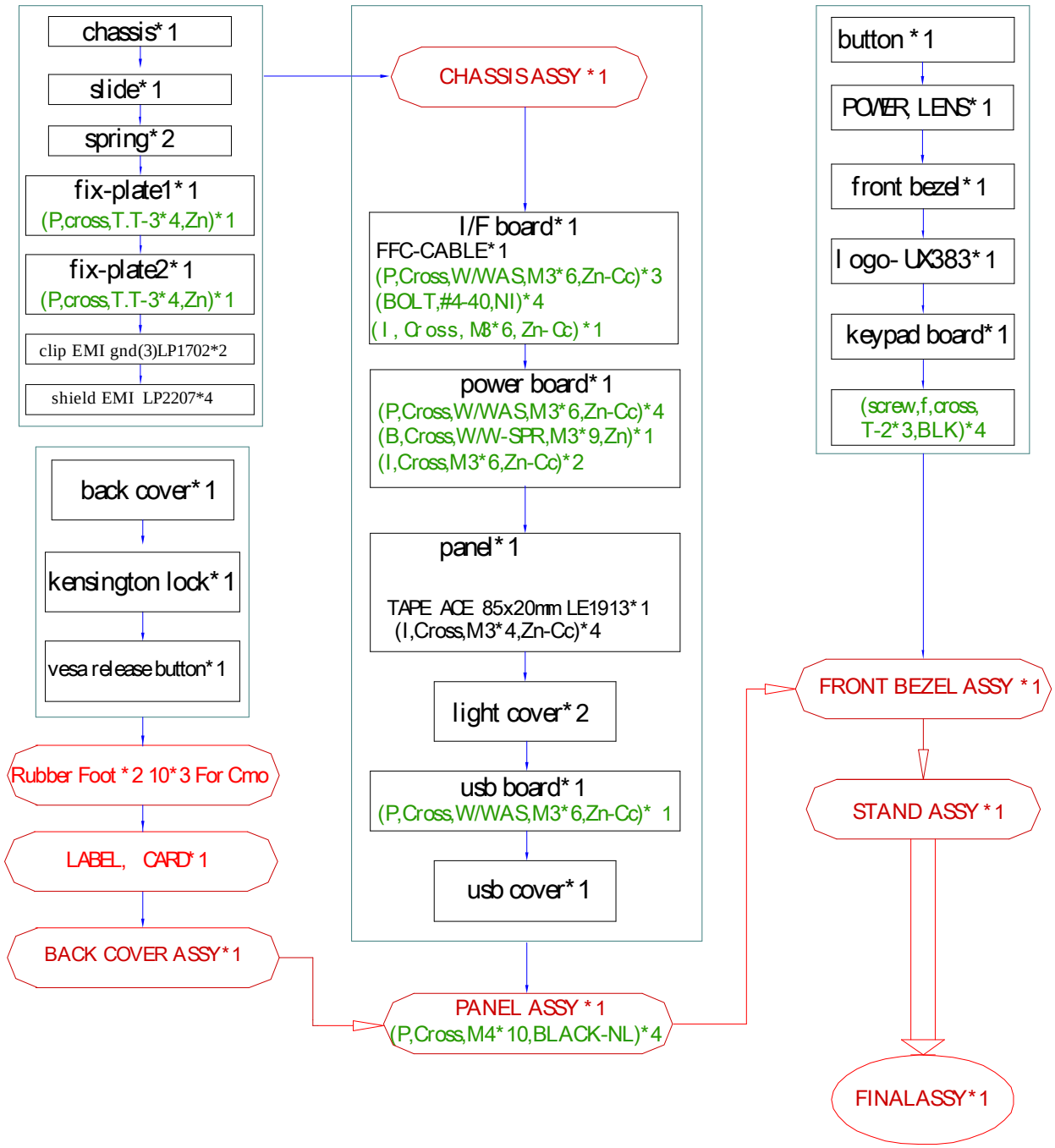
2. P2210 Disassembly Block



Note: 1. The arrows point out the direction of disassembly.

3. Assembly Block

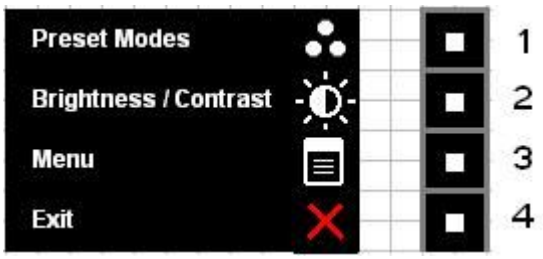
LP2261 ASSEMBLY BLOCK



Note: 1. The arrows point out the direction of assembly

Chapter 5- TEST AND ADJUSTMENT

1. Function key Definitions



Hot Key Operation

Key1	To enter Preset modes menu
Key2	To enter brightness/contrast adjust menu
Key3	To enter OSD Main menu
Key4	To exit OSD Menu

Key function defining in Main Menu

Power Switch with power LED indicator	*Power:* On/Off, includes power indicator and Power ICON blue- Active On Amber- DPMS
Panel Controls	1. Key1: When "MENU OSD" displays, press this key to ch the contents of an adjustment item, or change an adjustment value(use as up key) 2. Key2: When "MENU OSD" displays, press this key to ch the contents of an adjustment item, or change an adjustment value(use as down key) 3. Key3: When "MENU OSD" displays, press this key to Er the OSD sub menu When "MENU OSD" displays, press this key to sel input source 4. Key4: When "MENU OSD" displays, press this key to ba previous OSD menu 5. Power: Power on or off the monitor
Factory Modes Keys Function	*Auto Color Balance* Purpose: Automatically calibrate chip ADC parameter by using chip inte DAC. Process: If we want to do "*Auto Color Balance*" again, please confirm tl following steps. 1) Connect the VGA cable with the standard video pattern generator a display the pattern with blackest and whitest colors. 2) Press "*Power Key*", to power off the monitor. 3) Press "*Key1* " and "*Key2*" simultaneously, and then press "*Power K* power on the monitor. 4) Press "Key1", then entry "Factory mode". 5) Set Burn In Mode item to ON, then execute Auto Color 6) After the "Auto Color Balance" process finished, go bac Main Menu, choose "Other settings" item and press "Ke enter sub-Menu , then choose "factory reset" item and p "Key3" again execute Reset all settings. .

OSD Control

First	Second	Third	Default	VGA	DVI	DP
Brightness	Brightness		75	Yes(DCR off)	Yes	Yes
	Contrast		75	Yes	Yes	Yes
	Dynamic Contrast		off	Yes	Yes	Yes
Auto Adjust				Yes	No	No
Input Source	Auto Select			Yes	Yes	Yes
	VGA					
	DVI-D					
	DisplayPort					
Color Settings	Input Color Format	RGB		Yes	Yes	Yes
		YPbPr				
	Mode Selection	Graphics				
		Video				
	Present Modes	Standard				
		Multimedia				
		Game				
		Warm		Yes	Yes	Yes
		Cool				
		Custom(R,G, B)				
	Hue					
	Saturation					
	Reset Color Settings					
Display Settings	Wide Mode	Fill		Yes	Yes	Yes
		4:3				
	Horizontal Position		50	Yes	No	No
	Vertical Position		50	Yes	No	No
	Sharpness		50	Yes	Yes	Yes
	Pixel Clock		50	Yes	No	No
	Phase			Yes	No	No
	Reset Display Settings			Yes	Yes	Yes
Other Settings	Language	English		Yes	Yes	Yes
		Espanol				
		Francais				
		Deutsch				
		日本語				
		Russian				
		Brazilian Portuguese				
		簡體中文				
	Menu Transparency		20	Yes	Yes	Yes
	Menu Timer		20	Yes	Yes	Yes
	Menu Lock	Unlock		Yes	Yes	Yes
		Lock				
	Menu Rotation	Landscape		Yes	Yes	Yes
		Portrait				

	Power Save Audio	On		Yes(When connect sound bar)	Yes(When connect sound bar)	Yes(When connect sound bar)
		Off				
	DDC/CI	Enable		Yes	Yes	Yes
		Disable		Yes	Yes	Yes
	LCD Conditioning	Disable		Yes	Yes	Yes
		Enable		Yes	Yes	Yes
	Factory Reset			Yes	Yes	Yes

Hot Key Operation

FUNCTION	HOT KEY OPERATION					DESCRIPTION
	Key1	Key2	Key3	Key4	POWER	
FACTORY MODE	•	•			ON	Press [Key1]& [Key2] at the same time, and then press [POWER] for DC power on. Press Key1 to en factory menu
SERVICE PATTERN	•			•	ON	Press [Key1]& [Key4] at the same time when powe on to enter service pattern.

OSD Message

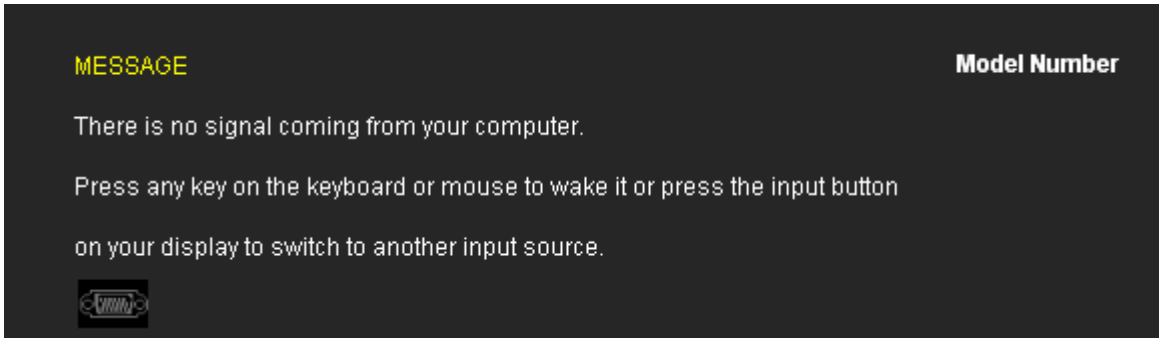
5.3.1 After disconnecting the cable, Self Test message should show as below:

"NO VGA Cable"

Present input status (1.stands for Auto Detect, 2 stands for VGA input, 3 stands for DVI input, 4 stands for Display Port), and present input source should be shown on the top of the message.

5.3.2 After disabling the sync output for VGA (DVI), DPMS message should show as below for 3s:

Press the "-" or "+" key and the DPMS message should show as below:


MESSAGE
Model Number
There is no signal coming from your computer.
Press any key on the keyboard or mouse to wake it or press the input button
on your display to switch to another input source.

."

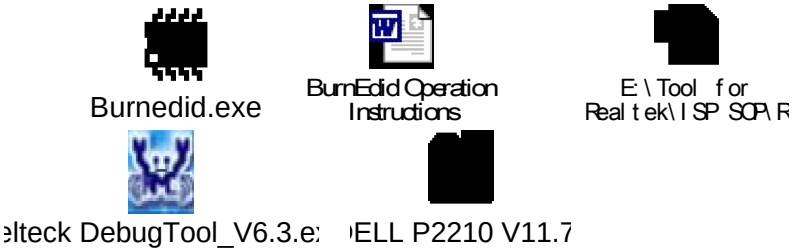
Present input status (1.stands for Auto Detect, 2 stands for VGA input, 3 stands for DVI input,4 stands for DP input)

Upgrade Firmware to Serial via Flash Cable by ISP_Tool V4.100.exe

7.1 Connect the monitor and PC follow Fig 11

Fig 11

※ The detailed reprogramming procedures will be described in ISP User's Guide.



After repair, to ensure the quality you should do the following test and adjustment.